

Midterm

Show all your work for each problem. Answers with insufficient work shown will not receive full credit.

**Instructions:** This test is open book and open notes and you may use a scientific calculator. You may not collaborate with any other person and you may not search for information online or in any other source. Your work must be completely justified and written in your own words.

Work that is not fully justified will not receive full credit. Papers with *unusually* identical language, or with language that matches with an online source, will be referred to the Office of Student Conduct for further investigation and may result in a zero for the assignment and/or further penalties.

1. (20 points, unless skipped) **Disks/Washers**.

**CHOOSE either this OR Question #2 to solve.**

**If you choose to skip this question, write “SKIP #1” for this question.**

(a) Sketch the region  $R$  bounded by ... and **shade** the region.

(b) Find the volume of the solid obtained by rotating  $R$  around the ... by setting up the appropriate integral and solving.

2. (25 points, unless skipped) **Polar.**

**CHOOSE either this OR Question #1 to solve.**

**If you choose to skip this question, write “SKIP #2” for this question.**

(a) Convert  $(x, y)$ ... to polar coordinates  $(r, \theta)$  such that  $r \geq 0$ .

(b) Convert the equations from polar form to rectangular/Cartesian form, or vice versa, and **graph** the curve given by the equation.

i. .... (convert to rectangular/Cartesian)

ii. .... (convert to polar)

3. (25 points) **Parametric Equations.**

- (a) Sketch the parametrized curve by first eliminating the parameter to obtain an equation in  $x$  and  $y$ . Pay attention to the domain on  $x$ . In your sketch, indicate at least two points on the curve.

$$x = \dots$$

- (b) Given the parametric equations

$$x = \dots$$

Sketch the parametrized curve showing intercepts with axes, **without** doing any work like making a table or eliminating the parameter. In one sentence, how did you know what to sketch?

4. (25 points) **Sequences.**

- (a) Plot the first four terms of the sequence for each of (a) ... and (b) ... on two separate pairs of axes (label which sequence is which).

[continued  $\Rightarrow$ ]

- (b) In the table below “bdd” means “bounded”. Fill out the tables. If you are not printing, please draw tables like this on your paper.

sequence	bdd? (y/n)	bdd by which lines $y = M, y = L$ , or, why not bdd
(a) ...		
(b) ...		

sequence	mononote? (incr/decr/neither)	justification using algebra/calculus
(a) ...		
(b) ...		

sequence	converges/diverges? (to what value?)	justification using algebra/calculus
(a) ...		
(b) ...		

5. (25 points) **Geometric Series.**

(a) Consider ...

i. Calculate  $S_4$  for this series.

ii. Determine whether the series converges, and if it does, find the sum.

(b) Consider ...

i. Suppose that you are told that  $S_n = \dots$  for this series. Determine whether ...

ii. Determine whether the series in part 5b converges, and if it does, find the sum. ...